

What is claimed is:

1. A system for the percutaneous treatment of an aneurysm of an artery in a human subject, the system including:

a stent deployed with its sidewall covering the ostium of an aneurysm pocket that is formed in the wall of the artery of the human subject, the stent having a maximum circular opening diameter "L" between those stent struts that cover the ostium of the aneurysm pocket; and

a fill structure delivery system for placing aneurysm pocket filling structures into the aneurysm pocket, the fill structure delivery system including a fill structure delivery catheter that has a distal portion that is designed to be placed through the sidewall of the stent and into the aneurysm pocket, the aneurysm pocket filling structures having a compressed minimum dimension "d" when being placed through the catheter into the aneurysm pocket, the dimension "d" being expandable to a minimum dimension "D" after the aneurysm pocket filling structure is deployed into the aneurysm pocket, the dimension "D" being sufficiently larger than the diameter "L" so that the struts that form the sidewall of the stent prevent the aneurysm pocket filling structures from passing out of the aneurysm pocket and into the arterial circulation.

2. The system of claim 1 where the stent is designed to elute an anti-proliferative drug that is selected from the group containing, cytostatic drugs, sirolimus, everolimus, tacrolimus, analogs and derivatives of sirolimus, cytotoxic drugs, Taxol, paclitaxol, and analogs and derivatives of Taxol.
3. The system of claim 1 where the stent has a coating designed to decrease thrombotic activity and to reduce the incidence of subacute thrombosis.
4. The system of claim 3 where the stent is coated with phosphorocholine or heparin.

5. The system of claim 1 where the stent is designed to elute an anti-proliferative drug that is selected from the group containing, cytostatic drugs, sirolimus, everolimus, tacrolimus, analogs and derivatives of sirolimus, cytotoxic drugs, Taxol, paclitaxol, and analogs and derivatives of Taxol and the stent also has a coating that includes a drug that decreases the incidence of subacute thrombosis.
6. The system of claim 1 where the stent has a generally decreased cell size at its midsection compared to the size of the stent's cells near the ends of the stent.
7. The system of claim 1 where the stent is made from a metal that is selected from the group consisting of stainless steel, Nitinol, L605 or equivalent cobalt-chromium alloy or tantalum.
8. The system of claim 1 where the deployed aneurysm pocket filling structures have the dimension "D" that lies approximately between the dimensions 0.030 inches and 0.30 inches.
9. The system of claim 1 where aneurysm pocket filling structure is a minisphere which is a hollow spherical shell having a wall thickness "W" that lies between 0.001 and 0.020 inches.
10. The system of claim 9 where the minispheres have a hole through the spherical shell.
11. The system of claim 1 where the aneurysm pocket filling structures are formed from an elastomer.
12. The system of claim 11 where the elastomer has a comparatively low durometer.
13. The system of claim 11 where the aneurysm pocket filling structures are formed from an elastomer into which a radiopaque material has been added.

14. The system of claim 13 where the radiopaque material is selected from the group consisting of barium, contrast medium, powdered metal and powdered tungsten.
15. The system of claim 1 where each aneurysm pocket filling structures is formed from an open cell elastomer.
16. The system of claim 1 where the aneurysm pocket filling structures are coated with a material that improves their lubricity.
17. The system of claim 1 where the material of the aneurysm pocket filling structures is selected from the group consisting of a metal, part metal and part plastic, polyethylene, polyvinyl alcohol, polyurethane or silicone.
18. The system of claim 1 where the aneurysm pocket filling structures include a substance selected from the group consisting of sterile water, saline solution, contrast medium, heparin, anti-proliferative drugs or anti-thrombogenic drugs.
19. The system of claim 1 where the aneurysm pocket filling structures are formed from polyvinyl alcohol.
20. The system of claim 1 further including a fill structure storage tube as part of the fill structure delivery system, the fill structure delivery tube being designed to have compressed aneurysm pocket filling structures contained within its lumen prior to delivery of the aneurysm pocket filling structures into the aneurysm pocket.
21. The system of claim 1 where the fill structure delivery catheter has an outwardly extending shoulder located just proximal to the distal end of the fill structure delivery catheter, the shoulder having an outside diameter that is larger than the diameter "L" of opening between the struts of the stent.

22. The system of claim 1 further including a pusher rod being an elongated cylinder for most of its length, the cylinder having a diameter small enough to slide within the lumen of the fill structure delivery catheter, the pusher rod being designed to be able to push the aneurysm pocket filling structures into the aneurysm pocket.
23. The system of claim 1 further including an expandable filter that is designed to be placed into the artery of the human subject at a position that is distal to the ostium of the aneurysm pocket.
24. A method for the percutaneous treatment of an aneurysm in a human subject, the method including the following steps:
- a) deploying a stent into an artery at a location where the sidewall of the stent covers the ostium of an aneurysm pocket;
  - b) placing a guide wire so that its distal end lies within the aneurysm pocket;
  - c) advancing a fill structure delivery catheter over the guide wire until its distal end lies within the aneurysm pocket;
  - d) placing aneurysm pocket filling structures in a compressed form into the lumen of the fill structure delivery catheter;
  - e) pushing the aneurysm pocket filling structures through the lumen of the fill structure delivery catheter and into the aneurysm pocket, the minimum dimension "D" of each deployed aneurysm pocket filling structure being greater than the dimension "L" which is the diameter of the largest circular opening between the struts of the sidewall of the stent that covers the ostium of the aneurysm pocket.
25. The method of claim 24 further including the step of placing a fill structure storage tube containing aneurysm pocket filling structures into a proximal portion of the fill structure delivery catheter prior to delivering the aneurysm pocket filling structures into the aneurysm pocket.

26. The method of claim 25 further including the step of placing a liquid into the lumen of the fill structure storage tube prior to placing the aneurysm pocket filling structures into the aneurysm pocket, the liquid being selected from the group consisting of contrast medium and normal saline solution.